MARS EXPLORATION ROVERS (MER)
Human Factors Management Action Plan

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PURPOSE:
This Plan will ensure the effective management of human factors that have a critical impact on mission success. These include fatigue and the physical and emotional well-being of mission operations and science teams. This Plan establishes the strategies, procedures and guidelines that will address the concerns of the MER Operations Readiness Review (ORR) Board and implements the recommendations of the Scientific Advisory Panel and subsequent actions taken by the JPL MER Project Management Team regarding fatigue and other Human Factors. This Plan focuses on three phases of the MER mission: current cruise operations, Entry, Descent and Landing (EDL), and surface science operations. This plan is implemented for the time period from current cruise operations until end-of-mission in May 2004.

As with any safety program to reduce risk, the two key components are prevention and monitoring. Prevention is absolutely critical and is accomplished through education and reinforced awareness. Monitoring presumes the ability for early detection by a reliable, effective assessment tool. We conclude that this Plan must focus primarily on prevention because there is no effective, reliable and practical tool to assess or monitor for the early signs of fatigue impairment in an operational environment.

BACKGROUND:
Three teams are involved in the round-the-clock operations for the MER program:

Cruise Operations Team (J. Erickson)
Critical Work Period: Currently working

EDL Team (R. Manning)
Critical Work Period: January 1-5, 2004 and January 22-26, 2004

Science Team (J. Callas)
Critical Work: January 3, 2004 to end-of-mission (May, 2004)

The MER project management team very early in the program cycle recognized the critical importance of human factors, specifically fatigue, since surface operations would follow the Mars Sol cycle, which is 39 minutes longer than an Earth day. This meant that operational team members would be working shifts that would daily advance by 39 minutes, presenting gradually progressive disruptions to the normal sleep cycle.

The MER team brought in a fatigue countermeasures expert, Melissa Mallis, Ph.D. from the NASA Ames Research Center. Dr. Mallis is a research psychologist who studies fatigue management in various industrial environments such as space shuttle flight and long-haul military air transport.

Starting in September 2002, Dr. Mallis and her affiliated consultants gave daylong workshops and shorter presentations to team managers, staff and the HR support team on sleep, fatigue impairment and countermeasure strategies. Dr. Mallis continues to be involved as a consultant to the MER and HR support teams and provided valuable input to this Plan.

When asked about the ability to monitor MER team members for the early signs of fatigue impairment, Dr. Mallis stated that no valid, reliable assessment tool exists that medical staff could use during once or twice shift walk-throughs. She states that such monitoring is not effective and could give a false sense of security. She said that technologies exist for such monitoring, but they require continuous monitoring of certain physiologic factors and are impractical in an operational environment such as MER mission operations. She was emphatic that the greater value is in focusing on prevention through education and reinforced awareness of the effects of fatigue and maintaining proper sleep cycles. She said that with proper sleep cycle management, the risk of fatigue-induced impairment is significantly reduced, no matter what shift the individual is working. This is consistent with conventional safety and occupational health philosophy about injury risk management in which prevention is preferable to medical monitoring, especially when no reliable monitoring tool is available.

A Scientific Advisory Panel was commissioned by JPL January 10, 2001 to evaluate the staffing requirements of the Mission Operations System that would be used to support sustained MER Surface Operations. The Scientific Advisory Panel, which included Dr. Mallis, was asked to develop a set of recommendations, many of which have been implemented such as:

- Provide education and awareness programs to employees and their families about managing sleep and fatigue, including the effects of commonly used drugs, such as caffeine, alcohol etc..
    - Resource Guide on Managing Fatigue and Sleepiness for Project Managers and Their Families (Attachment 1)

- Develop a policy for work schedules that considers Human Factors – limiting work hours, defining adequate time off for sleep, 3 shifts, and implementing 4 on 3 off work schedule.

- Training at least two people for each job

- Providing on- site nap facilities

- Providing round the clock food service

- Posters in work areas as reminders on fatigue countermeasures, medical and EAP contact numbers (Attachment 2)

The MER team management and staff recognize the importance of these human factors to mission success and initiated review of the issue by a Scientific Advisory Panel and enlisted the help of Dr. Mallis. The team's recognition that human factors are important and their involvement in the training sessions indicates that compliance with fatigue countermeasures will be high and that prevention strategies will be successful.

PROCEDURE:

Fatigue and Stress

A physician and/or Occupational Health Nurse will provide 24/7 medical support during certain critical periods of mission operations and will provide service support appropriate to the operation-specific risks during other periods. The three phases of MER operations have special characteristics that determine the type of services needed.

Cruise Operations. This team is currently working 10 –12 hour, 4 day on 3 day off shifts. This does not present a special risk for fatigue impairment over and above regular shift work and no extraordinary medical support is planned. Occupational Health Services (OHS) will provide flyers and posters that reinforce awareness of fatigue and countermeasures to MER team managers and staff during this phase.

The second and most publicly visible critical work period involves the Landing Team during Entry, Descent and Landing (EDL) of the Rovers on Mars. During this time period, a physician and/or Occupational Health Nurse will be present round-the-clock for the 48 hours before and 48 hours after EDL. The medical staff will consist of the JPL physician and either JPL or contract Occupational Health Nurses. This extraordinary level of support is needed because of the critical nature of these operations, the greater than normal number of people on-Lab after-hours and the high visibility of this phase.

The third critical work period involves the Science Teams. This phase starts January 3, 2004 with the landing of Spirit and will continue until the end of the mission in May 2004. A second team will start with the Landing of Opportunity on January 24 and also continue to the end of the mission, May 2004. During this period, fatigue will be a significant risk because of the advancing shift schedule as the teams follow the Mars Sol cycle. Members of the OHS team will visit the operations staff one to two times a week each shift to reinforce fatigue impairment awareness and countermeasures. During these visits, the physician or Occupational Health Nurse will be available to team members for personal health consultations and blood pressure checks. They will also consult with team leaders regarding employees at health risk because of fatigue or other health problems. The frequency of visits is determined by the need for fatigue awareness reinforcement without extinguishing its value by doing it too frequently. We also want to minimize the intrusion during mission activities.

A schedule of physician or nurse visits will be developed with concurrence from MER team managers and will be posted with specific times and dates for the convenience of employees. Finalization of this schedule will be completed once the MER Science Team leader establishes the shift start and end times for each Sol cycle for the duration of the mission. (Attachment 3)

Medical Support

The medical support for the MER mission, current and to the end of mission, will consist of the following elements during these three phases:

Cruise Operations: Currently and to 01/01/04.

- OHS staff will provide coverage and availability during first shift, M-F, except holidays.
- JPL Emergency Medical Technicians will provide emergency medical support and first aid during second and third shift, weekends and holidays.
- If additional needs for medical support are identified, this schedule will be modified.

EDL: Starting second shift 01/01/04, continuing through third shift 01/05/04 and again starting second shift 01/22/04 and continuing through third shift 01/26/04.

- OHS staff will provide on-duty coverage through all shifts.
- JPL Emergency Medical Technicians are available for emergency medical support and first aid.

Science Surface Operations: Starting first shift 01/06/04 to first shift 01/22/04 and again from first shift 01/27/04 to end of mission in May 2004.

- OHS staff will provide coverage and availability during first shift, M-F.
- OHS staff will also visit mission operational and science teams once or twice a week each shift at a schedule to be arranged with the team managers.
- JPL Emergency Medical Technicians are available for emergency medical support and first aid.
- This schedule and coverage strategy will be adjusted if mission medical support needs change.

Fitness for Duty Evaluation.

Determination of a team member's fitness for duty will involve assessment by an OHS professional and discussions with the JPL physician, EAP manager and the MER team leader to agree on the best course of action.

GUIDELINES:
The following employee guidelines will be provided to MER team members by hardcopy or email advisories.

Illness
When you are ill, it is important to stay home, away from others, and get some rest. Staying home will protect the health of all your team members during this critical time and will help you get well quicker so you can get back to work sooner.

The following are guidelines for deciding if you should come into work or if you should leave work to rest. Consider staying home if you have:

1. Nausea or vomiting, currently or recently
2. Diarrhea
3. Frequent coughing or sneezing
4. Evidence of a communicable disease such as a rash, fever or unusual sores
5. A temperature of 100 degrees or above, chills
6. Sore throat
7. The early stages of a cold or just generally feeling “bad or sick”, like you might be “coming down with something.”
8. Unusual watery, burning or red eyes, especially if there is a thick discharge or crusting at the eyelashes.

See your doctor right away - even sooner than you might otherwise because you are a critical member of a critical mission. Your health is very important.

A Personal Hygiene Kit
A checklist of useful/necessary items to have available during these critical time periods has been prepared for the MER team members. (Attachment 4)

External Stressors
External stressors such as a natural disaster (earthquake, fires) or can’t be predicted and can affect the stress level and ultimately the focus on the task at hand. Pre-planning can help to ease the stress level. In case of any type of an emergency, pre-plan with your family so that if you can’t leave work right away, they know what to do until you can get there.

JPL Management including the MER Team Management must be ready to address external stressors and the effect it may have on the MER Team.

For emergencies affecting JPL, the JPL Multi-Hazard Emergency Response Plan - Rev 2 will be implemented and the Emergency Operations Center (EOC) will be activated as appropriate.

RESPONSIBILITIES:
Occupational Health Services (OHS) – will provide physician or Occupational Health Nurse support during critical work periods.

Mars Exploration Rovers (MER) Team Managers – will reinforce awareness of the importance of human factors to mission success, especially fatigue and illness. They will monitor the health and risk for fatigue in their team members and consult with OHS and EAP when needed.

Human Resources (HR) – through the HR support team will continue to render support to the MER mission within its functional purview.

Occupational Safety Program Office (OSPO) – will collaborate with OHS and MER team management as needed when health and safety issues arise.

Reference Documents:

This Plan complies with,
NASA NPD 1800.2A NASA Occupational Health Program
NASA NPG 1800.1 NASA Occupational Health Program Procedures

Attachment 1

A Resource Guide on Managing Fatigue and Sleepiness

for Project Team Members and Their Families

Working on any mission is an exciting endeavor. This excitement is experienced by the employees but very much shared by their families. Indeed, there are few places that provide the unique opportunities to make history the way we do at JPL/NASA and to contribute to the competitive advantages of our nation. The focus and demands of project tasks can be intense and become even more so as a project moves into the last phase – operations. This is where we learn after all the long months of hard work whether or not the spacecraft and the instruments will execute and complete the mission as designed. It is a cliffhanger of huge proportions. This intense period of work, often complicated by the need to live a schedule to match the destination planet's ~~(~~solar cycle, can impact the routine of the employees and their families. This guide was created to provide information on sleep and fatigue with resources and strategies to help employees and their families better plan for this exhilarating and demanding work phase.

Enclosed in this guide are:

- Basic explanation of the nature of sleep and fatigue
- Strategies that help maintain well-being and alert functioning
- Resources available to employees and family members

SLEEP MYTHS

"We need less sleep as we get older." This myth is based on the fact that the amount and structure of sleep change over the life span. Sleep becomes less deep and more disrupted with age. It is not that older individuals need less sleep but it appears that with age, our ability to obtain a consolidated and continuous period of sleep decreases. These changes can be seen in individuals starting as early as 50 years of age.

"We can make up sleep loss." A person cannot "make up" sleep equal to the number of hours they lost. An individual who has lost sleep may sleep longer than normal but the most notable feature is the increase in deep sleep.

What *is* Known About Sleep, Fatigue, and Circadian Rhythms

Sleep debt or waking sleepiness can contribute to fatigue and impact performance and alertness. Fatigue can also result from disruption of circadian rhythms.

The circadian pacemaker, located in the brain, is an internal biological clock that regulates different systems of the body, such as sleep/wake cycles and body temperature. Circadian rhythms are inherent daily rhythms, which can be synchronized or cued by environmental stimuli, such as bright light, work and rest schedules and regular social interactions.

This biological clock or circadian pacemaker defines the following for individuals:

- Times of maximum sleepiness
- Times when it is difficult to fall asleep
  (e.g. late morning, 3-4 hours before bed)

Some examples of fatigue that are influenced by circadian rhythms are:

- Fatigue from jet lag
- Sleepiness or getting tired at the same time everyday (between 3-5 a.m. and 3-5 p.m.)
- Fatigue from adjustment to shift work

The circadian clock cannot adapt immediately to a new environmental time or to a schedule change. The clock can only change slowly over a period of time and with different cues. Therefore, there will be times when team members will experience fatigue due to the continuous circadian disruption, resulting from shift work, night work, extended duty times, etc.

It is important for team members to become familiar with the signs and symptoms of fatigue and resultant stress and implement as many strategies to assist themselves and lessen the impact on others.

Signs and Symptoms of Fatigue and Stress

Physical	Mental	Emotional
Constipation/diarrhea	Decreased attention to detail	Apathetic
Digestive problems	Fixated/obsessed	Irritable
Muscle tension	Forgetful	Hyperactive/wound up
Nodding off	Memory impairment	Mood swings
Tired/lethargic	Negative thinking	Overly sensitive
	Poor abstract thinking	Silly/slaphappy

Reduced alertness
Slowed reaction time


Nature of Sleep

Like food and water, sleep is a physiological need that is vital to human survival.
Sleep loss can result in a cumulative sleep debt and waking sleepiness. Sleepiness should be taken seriously. The loss of sleep can accumulate and this results in what is known as a "sleep debt." The consequences of sleepiness are:

1. Decreased physical and mental performance
2. Decreased positive and increased negative mood
3. Increased vulnerability to performance decrements

Sleep debt's profound effects on waking performance, mood, and alertness can create a vulnerability to operational incidents and accidents.

Sleep Physiology

Sleep has two states:

1. NREM (non-rapid eye movement) where physiological and mental activity is slowed.
2. REM (rapid eye movement) where physiological and mental activity increase (an active brain "dreaming" in a paralyzed body).

NREM and REM alternate throughout the night, but the deeper sleep occurs more frequently and lasts for a longer duration in the first half of the sleep period. However, cycles of both NREM and REM are needed to healthfully restore the physical and mental functioning.

In a usual 24-hour day, there are two times of increased sleepiness, 3-5 a.m. and 3-5 p.m. (mid-afternoon slump). During these times, performance and alertness can be affected.



How Much Sleep Do We Need?

Basically, an individual requires the amount of sleep necessary to achieve full alertness and an effortless level of functioning during waking hours. While individual sleep needs vary, most adults require about 8 hours of sleep for all sleep cycles to occur. Some people need 6 hours, but others require 10 hours to feel wide-awake and to function at their peak level during wakefulness.

Quality and Quantity of Sleep

The quality of sleep can be as critical as the quantity of sleep in restoring an individual's level of alertness. If an individual obtains 8 hours of sleep, but the sleep is disrupted tens or hundreds of times, then, upon awakening, the individual may feel as if only a few hours of sleep were obtained.

Sleep Disorders

Currently, it is estimated that about 40 million Americans suffer from sleep disorders. are several physical sleep disorders that can disturb sleep and cause excessive sleepine wakefulness. Some of the more common sleep disorders, usually unnoticed to the suf individual, are Sleep Apnea, Periodic Leg Movement Disorder, and Restless Leg Syndrome. Information on these disorders is described below; however, for more information on sleep disorders, please talk to your medical doctor. Additional information can also be obtained from the following associations or websites:

http://www.sleepfoundation.org/publications.html (National Sleep Foundation)

http://www.aasmnet.org/ (American Academy of Sleep Medicine)

http://www.sleepnet.com/ (Sleep Net)

Sleep Apnea – Sleep apnea is a sleep disorder in which individuals cannot sleep and breathe at the same time. Apnea is a pause in the regular pattern of breathing. Essentially, apneic individuals fall asleep and then periodically stop breathing. When this occurs, little or no oxygen is available to the brain or body, thus disrupting sleep function. Awakenings are often associated with a gasp for air or a snore as the individual resumes breathing. It is potentially a lethal disorder because the brain does not respond during an apneic event. Physical and behavioral problems can be caused by sleep apnea, such as excessive sleepiness, cardiovascular difficulties, hypertension, and tiredness. Many individuals with sleep apnea are completely unaware that they have the disorder. Epidemiological studies suggest that 3-4% of the general population and 10-15% of males have sleep apnea. Its severity appears to increase with age. The textbook sleep apnea case is an overweight, middle-aged male or female who snores, has high blood pressure, and has problems staying awake during the day.

Periodic Leg Movement Disorder - Characterized by a twitching or muscular contraction of the lower leg muscles (or arms) during sleep, Periodic Leg Movement Disorder is a disorder that can disturb the quality of sleep. The twitch can occur in one leg or both, typically lasting only about 0.5 seconds and appearing in periodic episodes across the sleep period. There can be several hundred twitches during any given sleep period. Periodic limb movements constitute a sleep disorder because each muscular twitch is usually associated with either an awakening or a shift from deep to lighter sleep. This disorder can go unrecognized by the individual and is often first noticed by a bed partner.

Restless Leg Syndrome - Another sleep disorder that involves an irresistible urge to move the legs is Restless Leg Syndrome. It usually occurs prior to sleep onset and may result in difficulties initiating sleep.

Contact your personal physician if you have a concern that you or a loved one may have a sleep disorder, as many treatment options are available.

Actions to Counteract Fatigue and Sleepiness

For Immediate Relief: Holding Fatigue at Bay

Implementing strategies to assist in countering fatigue and sleepiness will help to provide temporary relief and minimize the impact of sleep loss and circadian disruption while on the job or feeling sleepy, although **they are not meant to replace sleep.** These strategies can be implemented when obtaining sleep is just not an option.

1. **Social Interaction** – Interact with others, including being actively involved in conversation.

2. **Caffeine Use** – Use caffeine strategically. Avoid it when you are already alert, such as at the beginning of a daytime work period or just after a nap. It is preferable to stop caffeine consumption at least three hours ahead of a planned bedtime to avoid its disruptive effects on sleep. Consume it about an hour before expected times of decreased alertness. Caffeine is most effective for those who are not already regular caffeine users and dependent on its effect. Optimally, you might want to cut back on caffeine intake many weeks before a challenging project phase in order to complete the caffeine withdrawal process, which can include headaches and irritability. Also keep in

mind that caffeine is a diuretic and overuse can lead to anxiety, irritability, tremulousness, insomnia, and dehydration.

3. **Physical Activity** –  Varying types of physical activity can include stretching, walking and isometric exercises, which may help to break the monotony of a continuous task.

4. **Snacks** - Nutritious snack foods are important. Simple carbohydrates, such as c and breads produce a transient increase in alertness, known as a "sugar high." Howev this is frequently followed by a decrease in alertness as blood glucose levels fall. Snacks, such as cheese and crackers, nuts and vegetables, will not produce the dramatic decrease in blood glucose.

5. **Bright Light** – Light, especially at dawn or high-noon, will assist you in waking up or staying awake.

6. **Breaks** – Take brief, frequent breaks rather than fewer longer breaks to help increase alertness.

7. **Temperature** – It is better to be cooler than warm when feeling sleepy or fatigued.

8. **Driving and Use of Machinery** –  People tend to overestimate their own level of alertness. If you feel the least bit drowsy, do not engage in any activity where you may injure yourself and/or others. Have a ***buddy system*** so you can ride with someone, rather than driving alone, and engage in conversation to help maintain alertness. If you think that an individual is showing signs of fatigue, and you are concerned about their safety, do not hesitate to intervene. If you are the individual about whom others have concerns, <u>listen</u> and utilize the buddy system.

9. **Power Naps** - Strategic use of naps has proven to improve performance and can also be used as a preventative measure to counter sleepiness. It is best not to start a new work schedule with a sleep debt.

If a nap is taken just before work, or at work, then it should be limited to a maximum of 45 minutes, which minimizes the chances of being interrupted from a deep sleep, where there is a high potential of grogginess and disorientation (a phenomenon called "sleep inertia").

Longer naps, approximately two hours, can be beneficial, which normally allows completion of at least one NREM-REM cycle through the different states and stages of sleep. A nap reduces the duration of continuous wakefulness before a work period and can be particularly beneficial before a period of night work.

The rule of thumb is, "Getting some sleep is always better than none." If you cannot get 8 hours of sleep, then supplement your time off with naps.

For Anticipative Fatigue: Some Preventative Strategies

The following strategies can help to minimize sleep loss and circadian rhythm disruption:

1. **Good Sleep Habits** – Use your bedroom or sleeping area only for sleep. No television or work should be done in this area. A dark room is best since a bright light is one of the cues for the circadian clock and can have alerting effects. Use of blackout curtains or a sleeping mask can help minimize light levels. These products can be purchased at most linen type stores or travel stores. The room needs to be quiet. However, if there is noise you need to block out, try the use of a "white noise" machine, earplugs, or relaxation tapes.

   It is best to be relaxed and to have a routine prior to going to sleep, such as turning down the lights, stretching, breathing exercises, etc., which will help cue the body that "it is now time to sleep." It is advised not to watch television or read a stimulating book prior to going to bed.

2. **Diet and Hydration** – Drinking plenty of water is critical to health, especially during times of stress or irregular routines. Because circadian rhythms don't change rapidly, the digestive track will still be accustomed to its regular meal times and generally will not have the stomach acids necessary to digest a big meal upon awakening. Additionally, it is important not to eat big meals prior to sleeping as this may interfere with sleep. Ensure there is a wide range of foods available at all times to accommodate the unusual eating patterns that may occur. Also high intake of sugar and caffeine can interfere with the quality and quantity of sleep.

3. **Alcohol** - Alcohol suppresses REM sleep. More than a couple of beers or glasses of wine can totally suppress REM sleep in the first half of a sleep period and interfere with the second half of sleep, thus disrupting the body's natural sleep cycle. Although alcohol is often used to unwind, its potential disruptive effects outweigh its usefulness in promoting the onset of sleep.

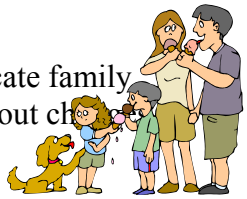
4. **Medications** – Check with your doctor regarding when the optimum time would be to take any medications given your work schedule. Some over-the-counter and prescription medications, such as decongestants, may keep you awake while others,

such as antihistamines, may cause drowsiness. Additionally, many over-the-counter drugs may contain caffeine or alcohol, which can potentially disturb sleep cycles. Use of sleeping pills may help you fall asleep and stay asleep. However, some sleeping pills may create drug dependence. Therefore, use medications under the guidance of a physician.

5. **Exercise** – Exercise can help some individuals with stress and sleep structure (increases amount of deep sleep). However, do not exercise <u>just</u> prior to going to bed (within 3 hours), as it will interfere with sleep.

6. **Days Off** – If you are working night shift or another type of erratic schedule, it is best to not revert back to a regular day schedule (i.e., sleeping during nighttime hours) on your days off. Rather, this is a time to get additional sleep if needed and optimize the transition to your next shift. Because your schedule may conflict with the normal waking schedules of others, plan activities and times you can socialize or entertain yourself without interfering with your sleep pattern, such as renting videos, meeting friends or family for breakfast or lunch, going to museums, and watching matinees.

<u>Family Strategies</u>



To minimize misunderstanding and to solicit support, it will be important to educate family members and friends on the relationship between sleep and fatigue and to talk about changes in routine during this work phase.

Keep communication lines open in regards to family needs, and utilize all available resources. As a family exercise, develop a plan for new sleep/meal schedules and ways to stay connected and to adapt to this temporary scheduling. Some suggested strategies are:

- Utilize alternative sleeping arrangements, such as those provided by JPL, or with relatives if it is difficult to drive home or to have a quiet, sleeping area.

- Reschedule the gardener or trash pick-up if necessary to ensure quiet sleep time.

- Identify activities and times you can socialize and connect with others without disrupting sleep time.

- Utilize alternative baby-sitting when needed to provide necessary relief for adults.

- Utilize pet sitters or day care centers if need be to ensure uninterrupted sleep.

- Help children to understand the bigger picture of how their parent is working on the project, and find ways to help children and family be a part of the mission.

- Stay connected by identifying alternative ways to communicate through e-mail, voice mail, and digital pictures. Keeping a family or communication journal is helpful; this involves a notebook or journal where family members can write notes to one another, including accomplishments, reminders, or special events of the day.

- Stay connected with *elder* members of the family and utilize some of the tips above, such as pictures, e-mails, etc. If eldercare is an issue, ask other family members to assist more during this time or research for other community resources, such as adult day care centers.

Do's and Don'ts When Preparing for Intense Work Periods

Do

- Plan Ahead
- Perform routine maintenance of home and car before intense work period
- Have regular medical and dental check-ups before intense work period
- Plan for short getaways for renewal
- Plan for down time for yourself after intense work period
- Reward yourself and family with a vacation or restful trip afterwards
- Be willing to try new things – like having holidays at home versus traveling to visit relatives

Don't

- Begin home projects, such as remodeling before or during intense work periods
- Increase your stress with visiting relatives
- Increase your stress by starting a new health regimen, like intensive workouts or quitting smoking
- Start a new intense work project immediately after. Allow yourself, your body, and family to normalize and recover

Remember that this schedule change is only temporary, and schedules will eventually return to normal.

Acknowledgment:

Many thanks to Dr. Melissa M. Mallis, Principal Investigator of the Fatigue Countermeasures Group at NASA Ames Research Center for her materials and assistance in making this resource guide possible.

Material based on:
Rosekind et. al. (2001). *Alertness Management in Flight Operations Education Module.* NASA Technical

Resources

The following resources are available to JPL personnel and their families. (Most of these websites are not available off-site without remote access.)

- JPL Occupational Health Services - Provides first aid and medical consultation to employees.
  Telephone number: (818) 354-3319.
  Website: http://eis.jpl.nasa.gov/medical/

- JPL Employee Assistance Program - Provides confidential, short-term counseling and consultation on personal and work issues, family problems, stress management, substance abuse, relationship issues.
  Telephone number: (818) 354-3680.
  Website: http://eis.jpl.nasa.gov/medical/

- Kennedy Space Center Employee Assistance Program - Is available to JPL personnel and their family members who have been deployed to KSC. Telephone number: (321) 867-7398.

- JPL Human Resources Child Care/Elder Care website - Provides community resources and information - http://hr/childcare/

- JPL Working Parents Support Group website - Provides community parenting and child care resources.- http://eis/~jedutra/wpgsite/

- NASA Fatigue Countermeasures Group – NASA Ames Research Center, Melissa M. Mallis, Ph.D.
  Telephone number: (650)604-3654.
  Website: http://human-factors.arc.nasa.gov/zteam/

Please Note: Sleep and circadian physiology are complex, and individual differences exist. Presented are the basic components of fatigue and recommended strategies/ countermeasures to help minimize fatigue. More detailed information is available at http://human-factors.arc.nasa.gov/zteam/. (Select the Publications link.)

Compiled by Cynthia Cooper
Employee Assistance Program Officer
JPL Occupational Health Services
(818) 354-3680
Building 310-202

Individual and Family Preparation Checklist

For Intense Work Periods

- ❑ Get dark curtains for a designated sleeping room
- ❑ Get eye masks and ear plugs
- ❑ Get relaxation tapes
- ❑ Adopt a bedtime ritual that promotes sleep
- ❑ Prepare grocery lists for easy-to-prepare meals at home and healthy snacks at work
- ❑ Have a family discussion to map out a family plan
- ❑ Identify baby sitting or child care needs
- ❑ Identify senior care taking needs
- ❑ Identify kennels or pet day care centers
- ❑ Develop together entertainment plans
- ❑ Plan for the end of the project a reward or trip.
- ❑ Schedule car maintenance
- ❑ Take care of house maintenance
- ❑ Schedule cleaning services around your schedule
- ❑ Schedule dentist appointment
- ❑ Schedule doctor appointment
- ❑ Discuss medications and side effects with doctor
- ❑ Schedule income tax filing and other legal services
- ❑ Set up automatic bill payment
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RESOURCES LIST FOR MER SUPERVISORS FROM OCCUPATIONAL HEALTH SERVICES AND EMPLOYEE ASSISTANCE PROGRAM

Occupational Health Services (OHS) 818-354-3319

Special arrangements for blood pressure checks and gym physicals can be coordinated so that the medical staff can come to the MER team during January and February 2004. To coordinate these activities, contact Susan Harper, R.N. at the above number.

To consult with a doctor or nurse regarding a distressed employee, please call Dr. Estrada or Susan Harper, RN at the above number.

MER team members with medical needs during the hours of 7:30 a.m. to 4:00 p.m. should call OHS at the above listed number so that arrangements can be made to see them as soon as possible. Please be sure the employee informs the receptionist that they are assigned to MER.

For after-hour medical needs, please call the Laboratory 911 number and the Emergency Medical Technicians will respond.

Employee Assistance Program (EAP) - 818-354-3680

To consult with an EAP Professional regarding a distressed employee or emergency, please call Cynthia Cooper at 818-354-3680 or cell phone 818-653-9552.

Attachment 3

Occupational Health Services (OHS)
Shift Schedule for MER

	MON	TUE	WED	THU	FRI	**SAT**	SUN	MON	TUE	WED	THU	FRI	SAT	SUN
				1-Jan	2-Jan	**3-Jan**	4-Jan	5-Jan	6-Jan	7-Jan	8-Jan	9-Jan	10-Jan	11-Jan
12M-8AM					RE oc	LP	RE	LP						
8AM-4PM					OHS	BH	BH	OHS	OHS	OHS	OHS	OHS		
4PM-12M				BS	BS	RE/KMT	BS	SH						

	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	**SAT**	SUN
	12-Jan	13-Jan	14-Jan	15-Jan	16-Jan	17-Jan	18-Jan	19-Jan	20-Jan	21-Jan	22-Jan	23-Jan	**24-Jan**	25-Jan
12M-8AM					EC									
8AM-4PM	OHS	OHS	OHS	OHS	OHS			OHS	OHS	OHS	OHS	OHS		
4PM-12M				JP									RE	

	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT	SUN
	26-Jan	27-Jan	28-Jan	29-Jan	30-Jan	31-Jan	1-Feb	2-Feb	3-Feb	4-Feb	5-Feb	6-Feb	7-Feb	8-Feb
12M-8AM					MS							EC		
8AM-4PM	OHS	OHS	OHS	OHS	OHS			OHS	OHS	OHS	OHS	OHS		
4PM-12M				JH							RL			

	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT	SUN
	9-Feb	10-Feb	11-Feb	12-Feb	13-Feb	14-Feb	15-Feb	16-Feb	17-Feb	18-Feb	19-Feb	20-Feb	21-Feb	22-Feb
12M-8AM					MSJH							EC		
8AM-4PM	OHS	OHS	OHS	OHS	OHS			OHS	OHS	OHS	OHS	OHS		
4PM-12M				JP							JH			

	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT	SUN
	23-Feb	24-Feb	25-Feb	26-Feb	27-Feb	28-Feb	29-Feb	1-Mar	2-Mar	3-Mar	4-Mar	5-Mar	6-Mar	7-Mar
12M-8AM					MS							EC		
8AM-4PM	OHS	OHS	OHS	OHS	OHS			OHS	OHS	OHS	OHS	OHS		
4PM-12M				RL							JP			

	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT	SUN
	8-Mar	9-Mar	10-Mar	11-Mar	12-Mar	13-Mar	14-Mar	15-Mar	16-Mar	17-Mar	18-Mar	19-Mar	20-Mar	21-Mar
12M-8AM					MS							EC		
8AM-4PM	OHS	OHS	OHS	OHS	OHS			OHS	OHS	OHS	OHS	OHS		
4PM-12M				JH							RL			

	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT	SUN
	22-Mar	23-Mar	24-Mar	25-Mar	26-Mar	27-Mar	28-Mar	29-Mar	30-Mar	31-Mar	1-Apr	2-Apr	3-Apr	4-Apr
12M-8AM					EC							MS		
8AM-4PM	OHS	OHS	OHS	OHS	OHS			OHS	OHS	OHS	OHS	OHS		
4PM-12M				JP							JH			

	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT	SUN
	5-Apr	6-Apr	7-Apr	8-Apr	9-Apr	10-Apr	11-Apr	12-Apr	13-Apr	14-Apr	15-Apr	16-Apr	17-Apr	18-Apr
12M-8AM					EC							MS		
8AM-4PM	OHS	OHS	OHS	OHS	OHS			OHS	OHS	OHS	OHS	OHS		
4PM-12M				RL							JP			

	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT	SUN
	19-Apr	20-Apr	21-Apr	22-Apr	23-Apr	24-Apr	25-Apr	26-Apr	27-Apr	28-Apr	29-Apr	30-Apr	1-May	2-May
12M-8AM					MS							EC		
8AM-4PM	OHS	OHS	OHS	OHS	OHS			OHS	OHS	OHS	OHS	OHS		
4PM-12M				JH							RL			

	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT	SUN
	3-May	4-May	5-May	6-May	7-May	8-May	9-May	10-May	11-May	12-May	13-May	14-May	15-May	16-May
12M-8AM					MS							RL		
8AM-4PM	OHS	OHS	OHS	OHS	OHS			OHS	OHS	OHS	OHS	OHS		
4PM-12M				JP							JH			

	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT	SUN
	17-May	18-May	19-May	20-May	21-May	22-May	23-May	24-May	25-May	26-May	27-May	28-May	29-May	30-May
12M-8AM					EC							MS		
8AM-4PM	OHS	OHS	OHS	OHS	OHS			OHS	OHS	OHS	OHS	OHS		
4PM-12M				RL							JP			

OHS	OHS M-F 7:30am-4:15pm regular schedule
	OHS staff 24/7 coverage
	OHS staff monitors MER operations First or Third shifts

Attachment 4

A Personal Hygiene Kit

Having a few essentials available to you in time of need can make a big difference. This is a list of things to consider having on hand. While Occupational Health Services can provide occasional over-the-counter medications for simple medical problems, it's best if you keep your own supply on hand of those medications you are accustomed to taking. Do keep a supply of any prescription medication you must take while at work.

√ Aspirin, Tylenol, or Ibuprofen. Whichever you usually prefer.

√ Prescription Medicines

√ Eye Drops for dryness. Plain Artificial Tears, TearsNaturale, GenTeal Lubricating eye drops are best to soothe and lubricate irritated, dry eyes. Medications such as Visine or Murine have a decongestant to "get the red out" but can irritate your eyes.

√ Vitamins

√ Lip Balm

√ Band-Aids

√ "Kleenex" tissues

√ Tooth Brush & Tooth Paste

√ Dental Floss

√ Ear Plugs

√ Sleep Mask

√ Energy Bars/favorite snacks

√ Small Flashlight

√ 2nd pair of prescription glasses, spare contacts

√ Change of clothes

√ Shower essentials